

1898, has steadily decreased from 1,050,000 cwt. to 602,600 cwt., and the value per cwt. has slightly decreased. The reason given for the reduction in value of line-caught fish is that the trawlers have been landing large quantities of cod. Thus, in spite of the large increase in the number of steam liners, which are, of course, independent of wind in getting to the fishing grounds, the catch per boat fell from about 182 cwt. to about 121 cwt.

It is interesting to note that for the herring fishing in the Buckie and Peterhead districts experiments have been made with sailing boats fitted with auxiliary steam power. The value of steam power is shown in another part of the report, where the catch of the Scotch boats (sailing craft) working from English ports during October and November is compared with that of the English boats, a large number of which are steamers. The Scotch boats caught more than 65½ per cent. of the total catch, but only got 46½ per cent. of the total value, the steamers always being able to make the market first.

The west coast mackerel fishing has shown great improvement, the catch in 1903 being 57 per cent. better than in 1902. The trade apparently only requires development, as "shoals of mackerel almost every year visit the coast."

In the report on salmon fisheries we learn that during the year Mr. Calderwood, Inspector of Salmon Fisheries for Scotland, made inquiries as to the views of the various fishery boards with regard to the limitation of netting in narrow waters, this move being an outcome of the report of the Royal Commission on Salmon Fisheries.

Some of the boards have already taken steps to reduce the netting in their rivers. In the Annan all nets have been removed, while in the Spey only about three miles of water is now netted. In the Aberdeenshire Dee an association has, for about thirty years, annually bought off the nets on some sixteen miles of water, and now both upper and lower proprietors are seeking to secure the permanent removal of these nets.

While eleven of the boards consulted passed resolutions in favour of reducing the netting, six were unable to express an opinion, and only one, the North Esk Board, passed a resolution against any such reduction. In Mr. Calderwood's words:—"The resolution was prepared and agreed to by the lower proprietors—who are in the majority—before the meeting took place, and was based upon the argument, supported by good evidence, that the present amount of netting in the district—which netting has been constant for a great number of years—has not produced a decline in the stock of fish. The question of improving the general interest of their *whole* district is complicated by other considerations which need not be referred to here."

One of the most important papers in this report is Mr. Calderwood's contribution to the life-history of the salmon as observed by means of marking adult fish, the first part of which appeared in the report for 1901. Since then 62 additional re-captures of marked fish have been made, which, with those previously caught, gives a total of 252 re-captured fish. From this material, and also from other results obtained in Scotland, Ireland, and Norway, Mr. Calderwood has been able to draw some important conclusions. We now have evidence bearing out the commonly accepted view that the great majority of salmon after visiting the sea return to the river they left.

The marking experiments seem to show that grilse spend less time in fresh water than salmon, running up and down from the redds more quickly than the latter.

Another very interesting fact brought out is that a grilse kelt after running down to the sea may return within a few months as a summer salmon of about 10 lb., or may remain in the sea until the following year, returning to the river as a spring salmon. This partly upsets the belief that spring salmon are old fish, for, although there is no doubt that old fish do run up in the spring, we now know that a fish of 18 or 20 lb. may only be five years old, according to Mr. Calderwood, and on its second return from the sea.

There is evidence showing that some fish spawn in two successive seasons, and one case, No. 7298, seems to suggest that the fish was spawning for the third year in succession.

There is a diagram, in which fish of various weights are considered as being of various ages, which shows the interesting facts observed as to the "dual migration" which exists, perhaps, in all stages of the salmon's life-history.

We know that all the fish of one hatching do not migrate to the sea at the same time. Some migrate at one year old, the great majority at two years, and some again at three years.

For the smolt to grilse stage Mr. Calderwood mentions three cases in which the smolts returned after a year and some months as grilse of 3½, 3½, and 6½ lb. respectively, and says "we have no data to show any other seasonal migrations which may occur at this stage." We do not know whether the authority for the cases is untrustworthy, but we recollect records of smolts marked and released being re-caught after a few months as grilse up to 8 lb. weight. Such cases are mentioned by Fraser ("On the Salmon, &c.", 1833, pp. 15, 16) and by Brown ("Stormontfield Experiments," p. 92), who says "the experiments here have shown . . . that all the smolts of one year do not return the same year as grilse, the one half returning next spring and summer as small salmon."

Mr. Calderwood shows that what he considers five-year-old fish do not increase in weight in the way that four-year-olds and six-year-olds do, and he suggests that this may represent the period in the life of the adult salmon when the reproductive function is at its best, and thus asserts itself at the expense of the body-growth.

Surely this classing of fish into ages by size can only be roughly correct at best. We do not yet know to what extent fish spawn annually or biennially, or whether a fish may rest several seasons after spawning. Yet if Mr. Calderwood's suggestion that the activity of the reproductive organs checks growth is sound, surely a fish spawning three years in succession—as No. 7298 suggests may happen—would be considerably smaller than a fish of the same age which spawned in alternate years or less often.

There are several other interesting papers in this part, but space precludes us from referring to them.

Part iii., scientific investigations, contains eight papers upon various subjects connected with marine fisheries. Dr. T. Wemyss Fulton, the superintendent, gives an account of the trawling investigations, and in another paper continues the report of his investigations on the rate of growth of fishes. He also reports upon the operations of the Nigg Marine Hatchery, and has another paper entitled "Ichthyological Notes" on the various interesting species taken during the year.

An important paper is that by Dr. Williamson on the life-histories of the edible crab and other decapod Crustacea. Dr. Williamson has discovered that the ova of the crab are not attached by mucilage to the long hairs of the spinnerets as was supposed, but that the eggs are actually pierced by the hairs, and are thus spitted in rows, the eggs not being attached to one another.

Dr. Thomas Scott contributes a paper on some rare and interesting marine Crustacea, and another upon some fish parasites new to the Scottish marine fauna.

The report is published at His Majesty's Stationery Office and can be obtained through any bookseller.

FRANK BALFOUR BROWNE.

#### PRIZE AWARDS OF THE PARIS ACADEMY OF SCIENCES.

AT the annual meeting of the Academy of Sciences the list of prizes awarded for the year 1904 was announced as follows:—

*Geometry.*—The Bordin prize to M. Servant, for his memoir on the determination of surfaces applicable to the paraboloid of revolution which pass through a given contour; the Vaillant prize, divided between M. Emile Borel (3000 francs) and M. Bricard (1000 francs); the Franceur prize to M. Émile Lemoine; and the Poncelet prize to M. Désiré André.

*Mechanics.*—A Montyon prize to M. Gustave Richard.

*Navigation.*—The extraordinary prize, of 6000 francs, divided in equal parts between M. Jacob (for his theoretical researches on the transmission of submarine explosions), M. Gayde (for a study of the resistance of hulls to submarine explosion), and M. La Porte (for hydrographic work on the coast of Brittany); the Plumey prize to M. Lucien Mottez, for important services to submarine navigation.

*Astronomy.*—The Pierre Guzman prize is not awarded;

the Lalande prize to Mr. S. W. Burnham, for his work on double stars; the Valz prize to M. de Campos Rodrigues, for work done at the Lisbon Observatory, with especial reference to the determination of the solar parallax by means of the planet Eros; the Janssen medal to M. Hansky.

**Geography.**—The Binoux prize, divided between M. Baratier (for his work in connection with Colonel Marchand's expedition in Central Africa), M. Bénard (for his work on Arctic exploration), and M. Alphonse Berget (for his book on the physics and meteorology of the globe); the Gay prize to Mr. Bell Dawson, for his hydrographic work in eastern Canada; the Tchihatchef prize to Lieut.-Colonel Lubanski, for his explorations in Indo-China; the Delalande-Guérineau prize to M. Auguste Pavie, for work in French China.

**Physics.**—The Hébert prize to M. Georges Claude, for his book on electricity for general readers; the Hughes prize to Lieut.-Colonel E. Ariès, for his publications on the theory of heat and chemical statics; the Kastner-Boursault prize to Captain Ferrié, for his work on wireless telegraphy.

**Chemistry.**—The Jecker prize, divided between MM. Freundler, Minguin, and Lespieau; the Cahour prize, divided between MM. Chavanne, Kling, and Binet du Jassonneix; a Montyon prize (unhealthy trades), divided between MM. Dupont and Détourbe.

**Botany.**—The Desmazières prize to M. Guilliermond, for his work on cryptogams, especially fungi; the Montagne prize to M. Camille Sauvageau, for his work on algæ; the de la Fons-Melicocq prize is not awarded.

**Anatomy and Zoology.**—The Savigny prize to M. Krempf; the Thore prize to M. d'Orbigny.

**Medicine and Surgery.**—A Montyon prize to M. Paul Reclus, for his memoir on the proper use of cocaine in surgery; to M. Kermogant, for his work on exotic pathology and hygiene; and to M. Cazalbou, for his researches on the trypanosomiasis of the French Soudan. Mentions are also accorded to MM. P. Launois and Roy, for their biological studies on giants; MM. F. Bezançon and M. Labbé, for their treatise on haematology; and to M. Odier, for his work on the action of electricity and certain poisons on nerve cells. MM. F. Marceau, P. Briquel, J. Gagnière, and R. Voisin are accorded citations. The Barbier prize to MM. Prenant, Bouin and L. Maillard, for their book on histology, and a mention to M. Pierre Lesage; the Bréant prize (accumulated interest) to M. Frédéric Borel, for his memoir on cholera and plague in relation to Mahometan pilgrimages; the Godard prize to MM. J. Albaran and L. Imbert, for their memoir on tumours of the kidney; the Baron Larrey prize to M. Conor, for work on typhoid fever, M. E. Lafforgue receiving a mention; the Bellion prize to M. Jules Delobel, for his book on hygiene in schools, M. Gabriel Gauthier receiving a mention; the Mège prize to M. G. Delamare, for his experimental researches on morbid heredity.

**Physiology.**—A Montyon prize to M. J. Jolly, for his memoir entitled "Experimental Researches on the Indirect Division of the Red Blood Corpuscles," a very honourable mention being accorded to M. C. Fleig, for his work on the mode of action of chemical stimulants on the digestive glands; the Philipeaux prize to M. Cristiani, for his work on thyroid grafting, an honourable mention being accorded to M. Joseph Noé; the Lallemand prize, divided between M. Maurice de Fleury (for his works on the nervous system) and MM. J. Camus and P. Pagniez (for their memoir on psychotherapy); the Pourat prize to M. J. Tissot, for a study of the physical and chemical phenomena at high altitudes; the Martin-Damourette prize, divided between M. A. Frouin (1000 francs) and M. Manquat (400 francs).

Among the general prizes, the Lavoisier medal was awarded to Sir J. Dewar, for his work on the liquefaction of gases; the Berthelot medal to MM. Freundler, Minguin, Lespieau, Kling, Binet du Jassonneix, Dupont, and Paul Villard; the Jerome Ponti prize to M. Maurain; the Trémont prize to M. A. Guillemin; the Gegner prize to M. J. H. Fabre; the Lannelonge prize to Mme. Vve. Nepveu; the Leconte prize to M. René Blondlot, for his work taken as a whole; the Wilde prize to M. Paul Villard, for his work in physics; the Houllevigue prize to MM. Henri de la Vaulx and Henri Hervé, for their work in aéronautics;

the Saintour prize to M. Charles Frémont, for his experimental researches on the elasticity of metals; a Montyon prize (statistics), divided between M. V. Lowenthal, for twelve memoirs relating to the depopulation of France, and M. Paul Razous, for his memoir on the mortality and liability to disease in dangerous professions, MM. Henry Guégo, E. Maury, and Ott receiving mentions; the Jean-Jacques Berger prize is divided between MM. J. Resal (6500 francs), A. Alby (3500 francs), Laurent (2000 francs), Grimaud (1500 francs), and Retraint (1500 francs).

#### UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

**LIVERPOOL.**—The arrangements for excavations to be made during the winter under the auspices of the university institute of archaeology, in Upper Egypt, have been completed, and the work will be begun at Hierakonpolis before the New Year. The excavations have been placed as in previous years at Beni-Hasan, Negadeh, and elsewhere under the care of the university reader in Egyptian archaeology.

DR. NORMAN MOORE has been appointed a member of the consultative committee *vice* Prof. Bertram C. A. Windle, F.R.S., who has resigned his membership upon appointment as president of Queen's College, Cork. Dr. Moore is chairman of the board of advanced medical studies of the University of London, and represents the Royal College of Physicians upon the General Medical Council.

THE annual meeting of the Geographical Association will be held at the Royal Colonial Institute, Northumberland Avenue, London, W.C., on Friday, January 6, at 4 p.m. The president, Mr. Douglas W. Freshfield, will be in the chair. A report on the eighth international geographical congress will be read by Mr. H. Yule Oldham, and there will be a discussion on practical geography in schools.

ON December 20 Lady Warwick distributed the prizes gained by the students of the evening classes and of the day secondary school of the Carpenters' Company at Stratford. In the course of some remarks upon the school, she said that England needed a better system of secondary education, and it was now acknowledged that the State should take the matter in hand. But in the meantime the city companies were doing a good work in bringing secondary education to the doors of the people.

THE annual conference of the Public Schools Science Masters' Association will be held at Westminster School on Saturday, January 14, 1905. The following are among the subjects to be discussed:—(1) the importance of including both Latin and natural science in a scheme of general education; (2) recent proposals for school leaving certificates; (3) the use and misuse of terms in science teaching; (4) the possibility of teaching "scientific method" to boys whose education is almost entirely literary and who have no time for a regular course in chemistry and physics. Sir Michael Foster, K.C.B., is the president of the association for the year.

NEW buildings of the Willesden Polytechnic, erected at a cost of about 10,000*l.*, were formally declared open by Sir W. Anson on December 21. After distributing prizes to the successful students, Sir W. Anson remarked that polytechnics marked what he hoped was becoming the modern view of education, that it did not consist of independent sets of studies, but was a composite whole, no part of which did not rest upon or form a foundation for another part. It should be borne in mind that a polytechnic did not merely train a student in a handicraft. The object of such an institution was to combine theory and practice, to teach the student not only how to do a thing, but why it was done in a particular way, so that he became not only skilful in the craft upon which he was engaged, but got to understand the scientific principles underlying his work.

MR. L. L. PRICE read a paper at the meeting of the Royal Statistical Society on December 20 entitled "Accounts of the Colleges of Oxford, 1893-1903, with Special Reference